

CHAPTER 1: INTRODUCTION

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1.1 GENERAL

This section of the VDOT Traffic Engineering Manual has been developed to provide guidance on the design of roadway lighting systems. The manual presents engineering fundamentals needed to design lighting systems. Examples are presented that will help develop the concepts needed to understand and design a lighting system. The manual has been divided into four Chapters as follows:

Chapter 1 presents an introduction to roadway lighting design.

Chapter 2 presents basic engineering concepts/guidance with background information on photometry.

Chapter 3 provides a discussion of issues that must be considered in the early development of a roadway lighting plan.

Chapter 4 presents the step-by-step process involved in the creation of a roadway lighting plan.

Appendix A provides an example roadway lighting plan.

Appendix B provides a detailed review of specific issues related to roadway lighting, including discussions on lighting equipment and electrical distribution.

1.2 PURPOSE OF ROADWAY LIGHTING

The purpose of roadway lighting is to attain a level of visibility that enables the motorist (and pedestrian) to quickly discern significant details of the roadway. Those details include the roadway alignment, the surrounding environment, obstacles on or near the roadway, and vehicles, people, animals, or other objects that are about to enter the roadway.

Nearly all aspects of traffic safety involve visibility. More efficient use of the roadway can be made when visibility is improved with the assistance of roadway lighting. Roadway lighting can also be an operative tool that provides economic and social benefits to the public.

The primary traffic engineering objectives of roadway lighting are to:

- Promote safety at night by enhancing visibility so that drivers and pedestrians can comfortably make decisions.
- Improve traffic flow by providing additional light beyond that provided by vehicle headlights. The purpose of the additional light is to delineate the roadway and its surroundings, to alert motorists to potential obstructions and other hazards, and to assist motorists in orienting themselves to the roadway's geometry.
- Illuminate long underpasses and tunnels during the day to permit drivers to have adequate visibility while entering, travelling through, and exiting such corridors.
- Other non-traffic engineering safety benefits include:
 - Discouragement of street crime at night or in other dark situations.
 - Enhancement of commercial zones and other activity zones to attract users.

1.3 VIRGINIA'S LIGHTING LAW (SENATE BILL SB379 & SB1351)

Senate Bills SB379 and its amendment SB1351 were passed by the Virginia Assembly and signed into law effective July 1, 2003. The law provides strict requirements on the procurement of light fixtures. The law states:

Require state public bodies to procure only shielded outdoor light fixtures and provide for waivers of this requirement when the Division determines that a bona fide operational, temporary, safety or specific aesthetic need is indicated or that such fixtures are not cost effective over the life cycle of the fixtures. For the purposes of this subdivision, "shielded outdoor light fixture" means an outdoor light fixture that is (i) fully shielded so that no light rays are emitted by the installed fixture above the horizontal plane or (ii) constructed so that no more than 2 percent of the total luminaire lumens in the zone of 90 to 180 degrees vertical angle is permitted, if the related output of the luminaire is greater than 3200 lumens. In adopting regulations under this subdivision, the Division shall consider national standards for outdoor lighting as adopted by the Illuminating Engineering Society of North America (IESNA).

Effective July 1, 2003, the Virginia Department of Transportation shall design all lighting systems in accordance with current IESNA standards and recommended practices. The lighting system shall utilize fixtures that minimize glare, light trespass, and skyglow, all as defined by the IESNA, while still providing a comfortable, visually effective, safe, and secure outdoor environment in a cost-effective manner over the life cycle of the lighting system.

1.4 ACKNOWLEDGMENTS

The following references are used throughout the Section:

- FHWA Roadway Lighting Handbook
- AASHTO Roadway Lighting Design Guide
- IESNA Recommended Practices for Roadway Lighting IESNA RP-8. IESNA Recommended Practices for Tunnel Lighting IESNA RP-22.
- IESNA Recommended Practices for Sign Lighting IESNA RP-19.
- The National Electric Code, NEC.